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# Ascending Centromedullary Nailing of Femoral Bilateral Supra Condylar Fractures: About Two Cases

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**Abstract** **Original Research Article**

Treatment of fractures of the lower extremity of the femur by retrograde intramedullary nail has benefited from the biological and mechanical advantages of this method. This technique requires an experienced hand and remains much faster than the open osteosynthesis plate. It is ideally suited to the treatment of bilateral supra-condylar fractures, in particular because it requires a single position and a single operative field. We report two cases of bilateral supra-condylar fractures in women treated at once by two retrograde intramedullary nails, with good recovery of flexion of both knees (100° right and 105° left).

**Keywords:** Bilateral fracture, ascending nailing, femur.



## INTRODUCTION

Fractures of the femoral diaphysis are a classic trauma and a major concern in hospitals. These fractures are very frequent because of the recrudescence of road accidents, which explains their occurrence in polytrauma patients with other serious life-threatening traumas. The mechanism of these fractures is not unambiguous and oscillates between high energy injury in young adults and low energy lesions in the elderly [1].

Fractures of the lower extremity of the femur (LEF) refer to fractures located under the bifurcation of the femoral linea aspera. They are infrequent; represent about 10% of all femoral fractures. These are serious fractures, often articular [1]. The gravity lies in the fact that those injuries are often comminuted and open fractures, affecting a bearing joint with complex mechanics.

In young subjects, violent and high energy indirect trauma is in cause (car accidents, falling from height ...). Sometimes the mechanism is less violent in elderly osteoporotic women [2].

Retrograde femoral nailing (RFN) is a technique that deserves to be included in the therapeutic arsenal for LEF fractures. This is a delicate method, requiring a perfect familiarity with the details of this technique.

We report two cases of bilateral supracondylar fracture in two women treated in one operating time by two retrograde intramedullary nails.

The aim of our work is to evaluate the functional and radiological results in the medium term of LEF treated by RFN, along with a literature review.

## MATERIEL AND METHOD

This study is about two cases of LEF fractures treated surgically by retrograde femoral nailing technique in the trauma and orthopedic surgery department of the teaching hospital of Rabat.

We collected clinical, radiological, and therapeutic and follow up features, and we confronted our results with the literature.

### CASES

**Case n° 1**

A 62 years old obese woman (BMI: 35 kg/m2) with osteoporosis, was injured due to fall from height, with reception on both knees causing pain and total functional impotence.

Clinical examination showed shortening and external rotation with swelling of both knees, without skin lesion. Pulse was well perceived, and there was no sensitive or motor deficit. (Figure 1).

Standard radiographs showed two supracondylar fractures of both femurs (Figure 2). Surgical treatment consisted of internal osteosynthesis by two retrograde intramedullary nails.

The patient was placed in supine position, both knees bent at 30° with two cushions placed under the knees, a single double field under the two lower limbs and the tourniquet was not used (Figure 3).

The first operative phase consisted of the osteosynthesis of the right femur, the longitudinal incision went from the lower edge of the patella to 3 cm below, then the opening of the patellar tendon longitudinally by a knife blade in a single movement to get closer to the lower tendon. At the level of the femoral condyles, the point of introduction is behind the notch and in the center by a curved pin, then a guide rod is introduced at the upper end of the femur, the bore progresses to size 11, and after achieving a satisfying reduction, a nail of size 10-38 and a distal double locking without proximal locking are introduced.

The second stage consisted of osteosynthesis of the left femur in the same way and retrograde placement of the same size.

Immediate postoperative radiographs were pleasing, except for a small recurvatum of 3 ° in the right femur (Figure 4.5). However, support is not allowed until consolidation 3 months after.

The 6 months follow up showed a correct mobility of both knees, with a right flexion at 100° and left flexion at 105°, without aggravation of osteoarthritis existing prior the fracture and a painless walk conferring autonomy to the patient.

**Fig-1: Clinical aspect of both fractured knees**

**Fig-2: X-ray showing the bilateral supranuclear fracture**

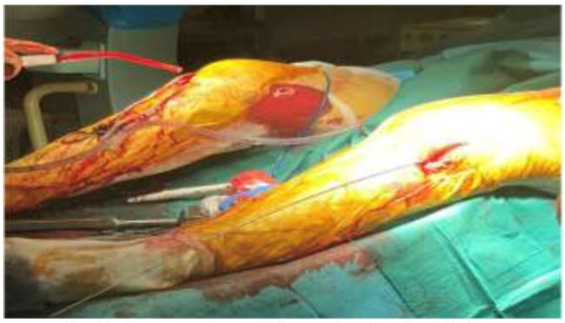

**Fig-3: Peroperative picture showing instalation**

**Fig-4: Postoperative radiographic control of face**

**Fig-5: Postoperative radiographic control of profile**

**Case n° 2**

A 57 years old woman, obese, with no relevant medical history, had a car accident on August 29, 2019, causing a closed trauma of the two lower limbs as well as upper limbs, associated with pain and total functional impotence.

The physical examination found a conscious patient, stable on the respiratory and neurological levels. The locoregional examination found a vicious attitude of the lower limbs in external rotation, with painful palpation and mobilization, along with bilateral trauma of both wrists.

Pulses were well perceived and symmetrical, and no sensitive or motor deficit was noted. The patient spent 4 days in the regional hospital of Tangier and 10 days in the Sheikh Zayed hospital in Rabat. She was then admitted to the department of trauma and orthopedic surgery of Rabat's teaching hospital.

Standard radiographs showed: fracture of the ¼ of the left femur, complex fracture of the lower third of the right femur, bilateral fracture of both radial and ulnar stylo, and fracture of ischia with slight displacement.

The patient was immediately immobilized with posterior splints of the upper and lower limbs, and received anticoagulants and analgesics.

1 / Innohep 0.7 / 24H
2 / Paracetamol 1g / 8H
3 / Nefopam 1g / 8H
4 / Biafine 3 times a day

The patient presented two days after the trauma with redness, edema, and Homans sign, typical symptoms evoking deep vein thrombosis (DVT).

Venous doppler ultrasound was performed on September 1st 2019, and objectified a DVT of the left limb with non-compressible hyperechoic endoluminal material in the left common femoral vein and no color Doppler flow. Popliteal vein was permeable. Another doppler ultrasound objectified an iliofemoral popliteal DVT.

On August 9, 2019 the patient was admitted to the operating room. She was placed in supine position both knees bent at 30° with two cushions placed under the knees, a single double field of the two lower limbs, the tourniquet was not used (Figure 3).

She received two retrograde intramedullary nailing in one surgical time. A Kapandji type broaching for both right and left wrists was performed. Post-operative radiographs were pleasing.

Postoperative treatment was prescribed: Amoxicillin and clavulanic acid 1g / 8H, paracetamol 1g / 8H, Nefopam 1g / 8H, Innohep 0.7cc/24h.

**Fig 6: X-rays showing the fracture of the lower extremity of the right radius**

**Fig 7: Post-operative X-ray of the left wrist**

**Fig-8: Initial radiographs of the two femurs**

**Fig 9: X-rays showing bilateral retrograde intramedullary nailing**

## DISCUSSION

The fractures of the lower extremity of the femur are located in the metaphyso-epiphyseal surface of the knee. They are considered, along with fractures of the acetabulum, elbow and calcaneus, as particularly difficult to understand and to treat.

Often comminuted and open, affecting a bearing joint with complex mechanics, they involve a high rate of complications and sequelae: osteitis, stiffness, osteoarthritis and even amputation.

Retrograde femoral nailing (RFN) is a technique that deserves to be included in the therapeutic arsenal for lower extremity of the femur (LEF). This is a delicate procedure, requiring a perfect familiarity with the details of the technique.

**Preoperative planning: [11, 12, 13]**

In a healthy patient, the nailing of an isolated fracture of the LEF can be achieved in a relatively short time after the occurrence of the trauma. The preoperative evaluation includes good-quality front and side radiographs of the knee and the LEF.

In situation of polytraumatized or multimorbid patients, like our second case, the intervention can be postponed for a few days or a week after the trauma. In these cases, the joint is protected by a large bandage and immobilized on splint. In the case of a comminuted fracture or a high displacement fracture, a trans-osseous traction of 5 to 10 kg can be achieved by trans-tibial pinning; rolled fields or sandbags are arranged on each side of the joint to minimize the mobilization of the fracture site and to improve patient's comfort.

**Installation: (Figure 13)**

Retrograde nailing is carried out under general anesthesia or spinal anesthesia using a brightness amplifier. The patient rests in a strict supine position on a conventional X-ray transparent operating table (no orthopedic table). The affected knee is flexed at 30° to 60°, using a transparent X-ray support placed under the middle third of the femur. The field must allow the passage of the brightness amplifier face as well as in profile [14-19].

**Fig-10: Illustration of the patient's intallation for bilateral RFN**

**Fig-11: Internal para-patellar approach [12]**

**Surgical Procedure**

Reduction is achieved by manual traction on the limb, controlled on the front and profile image intensifier. If a closed reduction can be obtained, the operation will be carried out percutaneously.

Once the reduction is achieved, it is maintained temporarily with Kirschner pins, which can also be used as guidepins for a perforated face. The pins shall, as far as possible, cross the condyles infront or rear (or both) of the site intended for the nail passage.

The optimal point of entry of the nail is in the intercondylar notch (Figure 20-21). Vertical incision of 2 to 3 cm perpendicular to the patellar tendon allows the introduction of a square tip. The medullary channel is perforated under the control of the shine amplifier.

A buttoned bore guide is introduced through the focus. The opening of the channel can be done by boring around the guide. Reduction can be facilitated by a temporary diaphyseal femoral and condylar broaching.

Boring of the medullary channel is done using straight or flexible boring devices. The diameter is generally 1, 5 to 2 mm bigger than the selected nail. The buttoned boring guide is replaced by the nail guide using the cabled reintroduction guide

(Figure 22). The nail is then manually inserted into the spinal canal through the fracture site (Figure 23). It is important to note that the nail should never be impacted. When the nail is set up, the fracture must be reduced and the member properly aligned [11,12,15,20,21].

No deviation in varus-valgus or condylar defect should be tolerated. Restitution of the anterior curvature of the distal femur can be achieved by moving the cushion or folded field placed under the knee. The nail is usually positioned, its curvature forward, but the opposite position is possible. The intrinsic curvature of the nail may help to better position it in the case that the point of entry is too anterior or too posterior [11,17,19].

Once reduction is achieved, it is not unusual to observe a shortening of the limb of 1 to 2 cm, tolerable especially in elderly patients.

The locking screws are inserted from outside to inside starting with the distal screws. It is important to respect the order of insertion of the screws knowing that the distal locking must be done first (Figure 24). Inserting the proximal screws first can indeed cause a piston effect of the condyles on the nail, compromising the reduction. The length of the screws is determined using the image intensifier [11, 14, 23, 24, 27, 28].

**Fig-12: Trans-tendinous approach**

**Postoperative care and rehabilitation: [11.20.22]**

Postoperative rehabilitation must be personalized in order to guarantee the final success of the intervention.

The goals sought during the first post-operative week are: control of leg edema, quadriceps awakening, and active mobilization of the ankle. Thromboembolic prophylaxis is systematic.

The first bandage is redone and the drains are removed after 48 hours. The stitches are removed after 10 to 14 days. Compression stocking is prescribed as early as the 3rd or 5th postoperative day. A bed rest splint or cast may be useful in young subjects with an unstable fracture, when weight bearing starts around the 6th or 8th week [29].

**Advantages and indications of the Ascending Centro medullary Nailing**

Supra-condylar fractures are localized in bone and cartilaginous zones of variable quality.

The AO classification determines three types [5]:
Type A: extra-articular fractures,
Type B: condylar fractures,
Type C: Intra-auricular fractures.

In A and C type fractures, the articular surface and the femoral condyles are separated from the femoral diaphysis. These fractures represent a good indication for ascending centro-medullary nailing. On the other hand, plate osteosynthesis is better adapted than the supra-condylar nail to the osteosynthesis of type B condylar fractures [6].

Supra-condylar intramedullary nailing has many advantages compared to other techniques. First, ascending nailing is easier to perform than downward nailing, requiring no orthopedic table, nor introduction of trochanteric nail. The ascending nailing is biologically preferable to the osteosynthesis in plate (plate and screw plate) realized with a closed hearth, without devascularization of the soft or periosteal parts.

## CONCLUSION

Bilateral supracondylar fractures remain very rare and represent a therapeutic challenge for the orthopedic surgeon. Retrograde intramedullary nailing is the surgical treatment of choice. A perfect mastery of the technique allows a quick and effective intervention in one surgical time, ensuring early recovery and return to autonomy.

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